



Global climate change and contaminants--An overview of opportunities and priorities for modelling the potential implications for long-term human exposure to organic compounds in the Arctic

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Year: 2011
Journal: Journal of Environmental Monitoring : Jem. 13 (6): 1532-1546

Abstract:

This overview seeks to provide context and insight into the relative importance of different aspects related to global climate change for the exposure of Northern residents to organic contaminants. A key objective is to identify, from the perspective of researchers engaged in contaminant fate, transport and bioaccumulation modelling, the most useful research questions with respect to projecting the long-term trends in human exposure. Monitoring studies, modelling results, the magnitude of projected changes and simplified quantitative approaches are used to inform the discussion. Besides the influence of temperature on contaminant amplification and distribution, accumulation of organic contaminants in the Arctic is expected to be particularly sensitive to the reduction/elimination of sea-ice cover and also changes to the frequency and intensity of precipitation events (most notably for substances that are highly susceptible to precipitation scavenging). Changes to key food-web interactions, in particular the introduction of additional trophic levels, have the potential to exert a relatively high influence on contaminant exposure but the likelihood of such changes is difficult to assess. Similarly, changes in primary productivity and dynamics of organic matter in aquatic systems could be influential for very hydrophobic contaminants, but the magnitude of change that may occur is uncertain. Shifts in the amount and location of chemical use and emissions are key considerations, in particular if substances with relatively low long range transport potential are used in closer proximity to, or even within, the Arctic in the future. Temperature-dependent increases in emissions via (re)volatilization from primary and secondary sources outside the Arctic are also important in this regard. An increased frequency of boreal forest fires has relevance for compounds emitted via biomass burning and revolatilization from soil during/after burns but compound-specific analyses are limited by the availability of reliable emission factors. However, potentially more influential for human exposure than changes to the physical environment are changes in human behaviour. This includes the gradual displacement of traditional food items by imported foods from other regions, driven by prey availability and/or consumer preference, but also the possibility of increased exposure to chemicals used in packaging materials and other consumer products, driven by dietary and lifestyle choices.

Source: <http://dx.doi.org/10.1039/c1em10131e>

Resource Description

Communication:

resource focus on research or methods on how to communicate or frame issues on climate change;
surveys of attitudes, knowledge, beliefs about climate change

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A focus of content

Communication Audience:

audience to whom the resource is directed

Researcher

Exposure :

weather or climate related pathway by which climate change affects health

Extreme Weather Event, Food/Water Quality, Precipitation, Temperature, Other Exposure

Extreme Weather Event: Wildfires

Food/Water Quality: Chemical

Geographic Feature:

resource focuses on specific type of geography

Arctic

Geographic Location:

resource focuses on specific location

Non-United States

Non-United States: Asia, Europe, Non-U.S. North America

Asian Region/Country: Other Asian Region

Other Asian Region: Arctic

European Region/Country: European Region

Other European Region: Arctic

Health Impact:

specification of health effect or disease related to climate change exposure

Health Outcome Unspecified

Mitigation/Adaptation:

mitigation or adaptation strategy is a focus of resource

Adaptation

Model/Methodology:

type of model used or methodology development is a focus of resource

Exposure Change Prediction, Outcome Change Prediction

Resource Type:

format or standard characteristic of resource

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Review

Timescale: 

time period studied

Time Scale Unspecified

Vulnerability/Impact Assessment: 

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content